Report of the Subcommittee on Environmental and Sustainable Development Education

A Draft

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Introduction

The mistakes of current and previous generations and societies in dealing with pollution, degradation of the environment, and the steady depletion of the planet's resources have generated problems that cannot be resolved quickly, if at all. Whatever we as a province, or nation, or global community decide to do in dealing with these complex issues, it is generally accepted that sensible, practical and long-term solutions to these problems require well-designed educational programs.

The problems of the environment and sustainable development are complex and cross many socioeconomic, political, scientific and technological boundaries. Consequently, environmental and sustainable development education, and how it should be presented, is equally complex. It is unrealistic to assume or expect that a single public department or specialized interest group can resolve the province's environmental problems. To assume this is to greatly oversimplify the problem of coping with the environment and sustainable development and to ignore current fiscal restraints.

In this context, the Nova Scotia Round Table on The Environment and The Economy, and its various subcommittees, have a clear role to play in crossing many of these boundaries and examining the problems from a multi-disciplinary and multi-interest point of view. Following this theme, the membership of the Subcommittee on Environmental and Sustainable Development Education (hereinafter called the Subcommittee) is represented by staff of the Department of the Environment, the Department of Education, University teachers and administrators, as well as other qualified individuals who are involved in special activities related to the environment and education (Appendix A). The first meeting of the committee was held on April 9, 1990.

When the Subcommittee initially met, there was considerable discussion concerning the clientele for environmental and sustainable development education programs as well as the related programs that already exist in the province. The Subcommittee decided to concentrate principally upon the formal education programs in elementary and secondary schools, community colleges, colleges and universities. Nevertheless, some recommendations on communication with the public do appear in this report and are derived from discussion points that arose during our meetings.

The Subcommittee undertook a first hand, up-to-date, survey of all the programs in Nova Scotia that could be considered contributors to environmental and sustainable development education in its broadest sense. This includes not only formal programs offered in schools, colleges and universities, but also those offered by special interest groups and societies. The survey was successfully completed in the early spring of 1991. Most responses were from interest groups actively operating environmental awareness programs rather than environmental education in its strictest sense, and the remainder of the replys were from schools and institutions. This information was used to develop and refine the recommendations put forward by the Subcommittee. In addition to this, the survey serves as a catalogue of the groups, societies, and institutions that are interested either in some aspect of environmental awareness or environmental education. The survey, titled "Report on The Status of Environmental Education in Nova Scotia" is available, at no charge, from the Nova Scotia Round Table.

It is not difficult to become passionate about the state of the environment, the importance of the concept of sustainable development, and the urgent need to deal with issues related to each. However, the requirement of sustainable development will only be met successfully in the long term by applying a series of practical, balanced solutions. Throughout our discussions we have attempted to keep this in mind, and hopefully this is reflected in the recommendations that we propose for education in Nova Scotia on the environment and sustainable development.

Environment refers to the dynamic structures of the Earth's natural systems and their interactions with the social and technological systems developed and managed by humans.

Sustainable development refers to the ethical, social, economic and political practices which ensure the ability of the planet to meet the needs of the present while maintaining its ability to meet the needs of the future.

Recent generations worldwide have experienced unprecedented population growth, economic activity and a rise in consumerism which have contributed to a variety of severe environmental consequences. Faced with ocean pollution, the destruction of forests, waste management problems and the daily extinction of species, we have only recently become aware of the fragile nature of planet Earth. Each of our individual and collective actions influence the environment which, in turn, affects the quality of life. Our use and abuse of the environment continue to have wide-ranging effects on living things and their habitats.

Environmental and sustainable development education must be a part of every citizen's essential learnings. The development of an informed concern for the biosphere, geosphere and atmosphere is an important first step in the development of an environmentally literate and responsible citizenry. This informed concern must however be coupled with a positive attitude towards stewardship and active participation in the resolution of environmental problems.

There has never been a greater need for the people of Nova Scotia to be aware of the necessity to protect, maintain and promote a healthy environment. It is essential that all young people, along with other age groups, work together towards conservation and environmental improvement. This implies that schools, colleges and universities have a special role and responsibility for contributing to environmental and sustainable development education.

The Subcommittee on Environmental and Sustainable Development Education recognizes that discussions regarding the environment and sustainable development continue to be the subjects of considerable debate within our society and that there is no clear consensus about many environmental issues. It is therefore imperative that students develop an understanding of the environment through critical and reasoned analysis. They must also strive to clarify their own values and attitudes in relation to the environment and to appreciate that people hold different points of view. Such comprehensive understandings will provide our young people with the tools to be effective and informed environmental citizens.

Central to environmental education is the fostering of both positive attitudes towards environmental concerns and the sense that each person can make contributions appropriate to their age. Continually alarming youth about the dangers and threats to the environment may provoke a response of passivity or rejection rather than encouraging them to find out more and to take action. All students, but especially younger children, should have many opportunities to understand the wonders of nature before they deal with problems created by humans. Environmental and sustainable development education must therefore be sensitive to the individual learner's aptitudes, interests and stages of development and awareness.

For the purposes of this discussion paper, the Subcommittee defines sustainable development and environmental education as a set of learning experiences which focus on the development of an understanding of the natural world, the fostering of skills in democratic problem-solving and the promotion of values which will result in the creation of a sustainable development culture. A sustainable development culture will facilitate a process in which resource exploitation, investment strategies, technological innovation and development, and institutional change develop in harmony with the environment, thereby allowing society to meet the needs of the present without compromising the ability of future generations to meet their needs.

Mission Statement

The mission of environmental and sustainable development education is to increase awareness, understanding and appreciation of the natural world, to identify environmental problems and their possible solutions, and to lay the foundations for the active participation of informed individuals and groups in the stewardship of the environment, including the prudent and rational use of natural resources through sustainable development practices.

Guiding Principles for Environmental and Sustainable Development Education

It is the responsibility of this generation to maintain a healthy environment which can be passed on to future generations as their rightful inheritance.

Each individual can contribute to the stewardship of the environment through their actions as an educated citizen and consumer.

There is a need for a prudent and rational utilization of resources. Sustainable development is therefore foundational to long term environmental stewardship.

Solving environmental problems through the selection of effective solutions requires interdisciplinary thinking.

Environmental education is a continuous life-long process.

Aims of Environmental and Sustainable Development Education

To develop awareness, appreciation and curiosity about the environment

To appreciate the significance of the impact that humans exert on the environment both as individuals and as members of society

To provide opportunities to learn the knowledge, skills, values and commitment required to understand, protect and nurture the environment

To examine, analyze and interpret the environment from a variety of perspectives including the historical, geographical, geological, biological, ethical, economic, political, technological, physical, chemical, aesthetic, sociological and spiritual and to integrate these and other views into a meaningful and coherent understanding of sustainable development

To encourage active participation in the resolution of environmental and sustainable development problems by identifying and implementing optimum solutions

Conceptual Framework for Environmental and Sustainable Development Education

Knowledge

Students should develop knowledge and understanding of:

- the importance of the natural environment
- the natural processes which occur in Earth systems, how they work and how they change over time
- the state of what is not known and what is known about the interdependence of the geosphere, biosphere and atmosphere
- the conservation of environmental diversity and productivity
- the principles and importance of sustainable development
- the impact of lifestyle and scientific, economic, business and

political decisions and actions upon the natural environment within a local, national and global context

- the social, ethical, economic and political dimensions of sustainable development within a global context
- the importance of planning and democratic consensus-building in the resolution of environmental issues
- provincial, national and international legislative controls to protect and manage the environment, including how policies and decisions are made about the environment

Skills

Students should develop competency in the following skills:

Communication skills

- expressing views, ideas and assessment of environmental issues which utilize a wide range of expressive skills including artistic, oral, written, dramatic and visual arts
- employing clearly articulated and reasoned arguments
- developing advisory and consulting skills

Research skills

- organizing, planning and carrying out an investigation
- retrieving, analyzing, interpreting, organizing and evaluating information about the environment from a variety of sources
- defining characteristics of an environmental issue

Information technology skills

- using a database
- simulating an environmental issue using computer-based software
- understanding the usefulness and limitations of models

Scientific skills

- formulating questions and identifying problems for investigation
- observing quantitatively and qualitatively
- designing and conducting investigations and experiments

- inferring, predicting, synthesizing
- testing hypotheses
- creating and evaluating theories

Numeracy skills

- collecting, measuring, classifying, calculating and analyzing data
- applying statistics to analysis
- using a variety of ways to estimate changes
- employing a variety of strategies to display data in order to find patterns and trends

Problem-solving skills

- utilizing creative and critical thinking
- identifying causes and effects
- forming reasoned opinions
- evaluating alternative solutions
- developing balanced judgements about environmental issues
- selecting and implementing alternative solutions and actions

Social skills

- working co-operatively with others in group activities or projects
- taking individual and group responsibility for the environment including actions which contribute to sustainable development

Attitudes

Students should develop the following positive attitudes:

- appreciation of the environment
- concern for the wellness of living things and their environment
- confidence in one's ability to make a difference
- desire for life-long learning with regards to the environment
- willingness to participate in democratic decision-making
- open-mindedness
- respect for evidence and rational argument

The Learning Environment

Environmental and sustainable development education must be a foundational component of every student's essential learnings. Like literacy, numeracy, and other fundamental goals, it must be integrated throughout all formal education programs. While individual units may focus on selected topics related to the environment as is now done in science and social studies programs, environmental and sustainable development education must be incorporated into all areas of academic, vocational and professional education. This must be accomplished both through a coordinated curriculum and through approaches to learning which are based upon the students being engaged in active inquiry starting with their prior knowledge and experiences and then proceeding to focussed problem-solving and experimentation.

In addition, it is essential that students should see within their institutions those practices which confirm environmental stewardship such as energy conservation, nurturing the surrounding environment, and effective waste management. Institutional policies and behaviors must be indicative of the education communities' commitment to students becoming lifelong, environmentally responsible citizens.

Overview of the Public School Program

Grades Primary to 12

Present Status The school system in Nova Scotia has a number of components within the present curriculum which focuses on the environment and, to a lesser extent, sustainable development. Environmental education is a cross-curricular focus of many subjects and disciplines. This focus is meant to reflect both the global impact of environment on all areas of human endeavor and on the interdisciplinary nature of environmental problem-solving. It is felt by the Subcommittee that the packaging of sustainable development and environmental education into a single course would tend to isolate this important topic which, in turn, would greatly lessen its effectiveness. Further, contact with these ideas must be regular, systematic and appropriate to each age group. No one course could accomplish this.

It should be emphasized that there are many dedicated teachers and administrators who have developed initiatives within their schools and into their communities which actively involve pupils in the essential learnings associated with the development of an environmentally literate citizenry. These teachers and administrators must be recognized and supported for their invaluable contributions. Strong efforts must be made to expand this pool of talented educators so that each school and classroom is environmentally committed.

Present Initiatives: An environmental and sustainable development education committee has been initiated to plan and coordinate the enhancement of environmental and sustainable development education in the Public School Program.

Curriculum task forces in various subject areas, grades primary to 12, will study the present curriculum guidelines and will be requested to suggest the appropriate infusion of the knowledge, skills and attitudes/values associated with exemplary environmental and sustainable development education into these subjects.

Recommendations

1) **Require environmental and sustainable development education be included in a variety of disciplines at all levels**. By incorporating appropriate environmental components into a variety of subjects throughout their school career, students will begin to appreciate the relationships of the environment to all facets of human life.

2) **Encourage schools to make environmental and sustainable development education a school-based focus**. Such a focus on the environment would go far beyond classroom teaching.

Environmental care for a school would provide pupils with a laboratory for applying their concepts in a real-life situation. Pupils would learn to participate in the development of the school's environmental policy, design action plans, create partnerships with parent, teacher and other community groups to manage implementation of these plans.

A school-based focus on sustainable development and the environment could focus on:

A) Internal Systems — reducing energy consumption; recycling; water conservation; managing waste from science laboratories, industrial arts/technology shops and art rooms; improving air quality through the addition of plants in classrooms

B) External Systems — planting indigenous plants; reducing litter; creating microhabitats for birds and other organisms

C) Community - School Partnerships — adopting a stream; returning a habitat or ecosystem to its natural state; recycling programs; partnering with department agencies, business, industry to develop a park.

3) **Provide intensive and sustained in-service training**. This is of paramount importance. The vast majority to teachers have little or no training in environmental and sustainable development education.

4) **Establish networks so that teachers, pupils and school administrators may share information, conduct collaborative projects, and share successes**.

5) **Identify or develop and make available resource materials which directly support the curriculum**. These resource materials include pupil books, teacher resource binders, audio-visuals and computer-based software or other technologies such as CD-ROM or VideoDisc.

6) **Conduct research to identify exemplary practices in environmental and sustainable development education**.

Elementary Program
Grades Primary - 6

Present Status: Units of study within the elementary program provide multiple opportunities for teachers to incorporate aspects of environmental education. Topics like animal families, meeting human needs in different climate zones in the social studies curriculum; animal habitats, limiting factors and resource utilization in the science curriculum and aesthetic appreciation of nature in the music and art curricula all contribute to learning about the environment. Teachers, students, parents and other community members throughout all regions of Nova Scotia provide a variety of other environmental learning experiences including recycling drives, habitat protection projects and community awareness campaigns. Although some schools commit the entire school to environmental issues, the participation is often based upon the enthusiasm of one or a few teachers. Even components of the curriculum which emphasize field work may be restricted only to the initiatives of a few classes in a school.

It should be noted that there are often great differences among schools and even between classrooms in the same school with regard to environmental learning experiences. In addition, there is a recognized need for a systematic, sequenced and clearly articulated outline of environmental skills, attitudes and knowledge as they apply to all subjects and more comprehensive policy statements on environmental education.

Present Initiatives: Revisions to the elementary science program presently underway will include one or more mandatory environmental topics at each grade level from primary to six. These environmental topics would be linked to the social studies, art, language arts and mathematics program as well as to other components of the science program including technological studies. The elementary health program has recently incorporated environmental topics into curriculum guidelines for grades P – 6. In addition, a set of attitudes, skills and knowledge with regards to environmental education will be carefully outlined in the curriculum guidelines and policy statements.

Recommendation:

7) **Assign three sustainable development and environmental education specialists to the Department of Education's Curriculum Division for a period of three years to:**

a) assist in the writing of curriculum guidelines for a variety of subjects

b) evaluate learning materials

c) design, develop and deliver professional development in-service programs for teachers and administrators

d) assist in the coordination of community, university and other government initiatives to educate youth and teachers.

Secondary School Program
Junior High – Grades 7, 8, 9

Present Status: There exists a number of opportunities to incorporate environmental knowledge, attitudes and skills into the junior high school curriculum. At present, the grade 9 Maritime Studies course and the grade 9 Science course have significant portions of their curricula devoted to environmental education. Maritime Studies integrates the

concept of environmental protection with topics focusing on resource development. The ideas of sustainable development are not however explicitly addressed. Grade 9 Science has a core topic on Environmental Science. Its aim is to help students understand the inter-connections of living and non-living components within the biosphere. Concepts are linked together to form generalizations which can be tested in a community study.

At the grade 7 and 8 levels, in both science and social studies, environmental education is included as optional topics on energy, renewable and non-renewable resources and forest management.

Present Initiatives: Review of curriculum to identify environmental strands in the curriculum and to find opportunities to infuse environmental themes into the science, art and social studies curriculum have begun. In particular, the revision of the grade 7 and 8 social studies curricula will emphasize the dynamics of the human-environment relationship including the study of the "in harmony concept" to sustainable development concerns of the 1990's.

Recommendation:

8) **Utilize the human resources identified in recommendation #7 to**

a) Complete a curriculum review.

b) Review and recommend resource materials.

c) Initiate in-services and workshops.

Senior High – Grades 10, 11, 12

Present Status: The senior secondary has had a variety of courses which include environmental education topics. For example, grade 10 Geography addresses issues of humans' use of the environment and the need for ecological planning. Grade 11 Canadian Geography deals with problems of economic development including the fragility of environments including the North. In science, grade 10 Biology includes topics such as ecosystem dynamics, population characteristics, ecological regulation and field studies within the curriculum; grade 10 Oceanography includes two units on ecological oceanography and the effects of pollution in the oceans; and grade 12 Geology includes a unit on geology, humans and the environment.

Other subject areas such as grades 11 and 12 Chemistry and grade 12 Biology include environmental concepts although to a lesser extent than the previously described topics.

Present Initiatives: A number of new environmental education initiatives is underway.

- Integrated Science – a new science-based interdisciplinary course for grade 10. Integrated Science has a significant environmental focus including a core unit focused on topics such as hazardous waste, forest management and sustainable farming.
- Global Geography – a new grade 12 geography course that will focus on a variety of environmental issues including sustainable development as it relates to global resources, environmental hazards, urbanization and feeding the planet.
- Revisions to the grade 10 Geography and History courses and introductory Biology will include significant environmental and sustainable development initiatives. Planned revisions to grades 11 and 12 Economics and grade 11 Geography will include environmental education topics.
- New courses being developed, including grade 12 Global History, will have a significant sustainable development focus.

Recommendation:

9) **Utilize the human resources identified in recommendation #7 to:**

a) Identify or develop appropriate resource materials

b) Design and deliver workshops and in-services

c) Develop units which focus on Nova Scotian environmental issues and sustainable development strategies.

10) **Revise Chemistry, Physics and Business courses to incorporate environmental and sustainable development topics into the curriculum guidelines.**

Universities and Colleges

Present Status: In Nova Scotia there are 13 degree granting institutions: Dalhousie University, St. Mary's University, Technical University of Nova Scotia, Mount St. Vincent University, Acadia University, St. Frances Xavier, University College of Cape Breton, Nova Scotia College of Art and Design, Nova Scotia Agricultural College, Nova Scotia Teachers' College, Université Sainte-Anne, Atlantic School of Theology, and the University of Kings College. Internal governance varies between institutions. Most include a few faculties comprising a number of schools and departments. Most have a form of an academic senate which approves curriculum, and oversees departmental reviews. In addition, academic requirements of external accreditation boards may guide the curriculum of a particular program of study. There is no single curriculum for all universities/colleges, and in this respect the university/college system differs significantly from the school system.

Present Initiatives: Our survey indicated that all universities and colleges have courses either directly or indirectly related to the environment and sustainable development. Topics dealing with the environment and sustainable development are currently included as part of course content, and most universities also have courses dealing specifically with the environment, for example, environmental geology, environmental ecology, environmental law, and environmental chemistry. In general, the bulk of environmental education is currently offered by science faculties, particularly by departments of biology and geology.

Reports like that of the Bruntland Commission have alerted members of the university/college communities to the importance of educational programs that will nurture, encourage and develop citizens, experts, and leaders capable of building social, political, technological and economic systems that are sustainable and equitable. How best to achieve this goal has been the subject of discussion and debate within the university and college community. There is legitimate concern about repeating the response to environmental issues that resulted in the proliferation of ecology programs during the 1960's and 1970's. While these programs met with some success, they did not address the need for developing experts and leaders capable of accomplishing an effective environment and sustainable development education program. The aims of

environmental and sustainable development education at the university/ college level should be to:

- foster a general awareness and sensitivity about the environment that will assist students in developing their own ethic regarding the environment, and sustainable and equitable development,
- encourage the application of this ethic within a discipline or profession, and
- develop specialists capable of working with multi-disciplinary groups to solve problems relating to the environment and sustainable development.

Recommendations

11) **Require undergraduates to engage in a rigorous program of cross-disciplinary study**. The foundation of post-secondary environmental and sustainable development education should be a solid liberal education at the undergraduate level.

12) **Allow universities to maintain a diversity of programmes in the arts and sciences**. Universities must be able to offer a liberal environmental and sustainable development education program at their institution that is integrated into curricula and is adopted by all undergraduate faculties including professional schools.

13) **Encourage and ensure the integration of environmental education and global sustainable and equitable economic development throughout the curriculum, including the industry portions of cooperative educational programs.**

14) **Incorporate environmental and sustainable development themes into courses while developing skills that will enable students to deal creatively and intuitively with problems of the future**. Teaching of university-level courses, particularly at the introductory level, must inspire the intelligent pursuit of curiosity about the natural world and an understanding of the importance of each discipline to the stewardship of Earth.

15) **Initiate continuing education programs on themes related to the environment and sustainable development for government officials, professionals and the general public, and encourage the development of partnerships with the public and private sector for the design and delivery of**

these programs.

16) **Establish a cross-disciplinary network of faculty from the provincial universities/colleges to develop and identify exemplary programs and continually address the questions: What kind of world do we have? What kind of world do we want? What educational programs will help us to get there?**

17) **Direct university presidents to develop and implement a strategic plan for integrating environmental education and sustainable development into both the curricula and the operation of the university, classrooms, laboratories and research facilities.**

18) **Conduct research to identify exemplary practices in environmental and sustainable development.**

The Community Colleges

Present Status: There are 18 community colleges. Just over half of the community colleges responded to our questionnaire. For those colleges that did respond, environmental education seems to be largely limited to recycling and waste management, with few exceptions.

Present Initiatives: The community colleges are in a state of flux in response to the White paper on a Community College System for Nova Scotians. There is thus a timely opportunity to infuse environmental and sustainable development education into the curriculum. The aims of this infusion are to:

- foster a general awareness and sensitivity about the environment that will assist students in developing their own ethic regarding the environment, and sustainable and equitable development,
- encourage the application of this ethic within a trade, profession or vocation, and
- develop technicians and other workers capable of using their skills to address environmental challenges.

Recommendations

19) **Require environmental and sustainable development concepts to be incorporated into all programs.** This could

be achieved by infusing environmental and sustainable development concepts into a required liberal education component of community college programs.

20) **Assess each profession, trade or vocation for the impact that each of these has on the environment**. The importance and mechanisms for reducing this impact can then be included in discipline-specific courses, and through the industry partner in cooperative education programs.

21) **Direct Department of Advanced Education and Job Training to develop and implement a strategic plan for integrating environmental education and sustainable development into both the curricula and the operation of the community colleges including classrooms, laboratories, shops and research facilities**.

22) **Initiate continuing education programs that provide opportunities for professional development regarding environmental ethics as applicable to each specific vocation, trade or profession**.

23) **Provide community college teachers and administrators with the necessary in-service training to be able to incorporate environmental and sustainable development education into their teaching**.

24) **Conduct research to identify exemplary practices in environmental and sustainable development.**

Outside the School System

Present Status: It is difficult to define the current status of environmental and sustainable development education activities outside the school and post-secondary systems. The survey completed by the subcommittee found that a number of private interest groups conduct environmental education programs for their members and the public. There is little indication, however, that these groups are involved in sustainable development education. Only two large industries responded to the survey, therefore, environmental and sustainable development education within industry is not well documented.

Recommendations

25) **The subcommittee should survey major employers within the province to determine the status of environmental and sustainable development education activities in their organization.**

26) **Industry should be encouraged to actively pursue methods to provide environmental and sustainable development education for their employees.** Such programs should be developed through partnerships with existing continuing education units, thus eliminating the need to develop another administrative structure.

Appendix A

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